Complex 96K6 Pantsir-S / Pantsir-S1 - SA-22 GREYHOUND

DATA AS OF 2025 (standard replenishment)
Complex "Roman" / "Pantsir-S1" - SA-X-22
Complex 96K6 "Pantsir-S" / "Pantsir-S1" , missile 57E6E - SA-22 GREYHOUND
Anti-aircraft missile and gun system of the Air Defense of the Russian Air Force. Developed by the Instrument-Making Design Bureau (hereinafter referred to as KBP, Tula), chief designer - Arkady Shipunov (later, as of 2006 - Alexander Rybas). Development of the ZRPK on the topic of the R&D "Roman" by order of the Air Defense of the USSR began in June 1990 as an ZRPK of the Air Defense Forces - it was assumed that the ZRPK would be used as a short-range air defense system to cover the positions of the S-300V and S-300 air defense systems, as well as to cover troop groupings. Later, the ZRPK was also offered to the Ground Forces, Airborne Forces and Navy of Russia. The ZRPK design used the KBP developments for the creation of the 2K22M Tunguska-M ZRPK. The prototype of the Roman / Pantsir-S1 complex was created in 1994 and was first publicly demonstrated at the MAKS-1995 air show. In the context of reduced funding for equipment purchases, the performance characteristics and capabilities of the Roman ZRPK (firing from a stationary position, performance characteristics for range, radar capabilities) did not satisfy the customer. Beginning in 2000, partial funding for the development of the ZRPK was provided by the United Arab Emirates. By 2005, the prime customer of the ZRPK was the Russian Air Force. The purpose of the modernized complex is close air defense of stationary objects (including long-range air defense systems) from air attack weapons. The need of the Russian Air Force is estimated at 100 complexes. After several upgrades, in 2006, tests of a modern model of the system on a KamAZ chassis were started at the Kapustin Yar proving ground. The Pantsir-S1 ZRPK tests were conducted during 2006-2007 at the Kapustin Yar and Ashuluk proving grounds in the Astrakhan region. Serial production of the ZRPK began in 2007. The Pantsir-S1 ZRPK was accepted into service with the Russian Armed Forces in 2008; the first ZRPKs were expected to enter service with the Air Force that same year (plans for 2007). In the spring of 2008, tests of the ZRPK were successfully completed, and by the fall, information appeared in the media that the first copy of the Pantsir-S1 ZRPK would be put into trial operation in the Russian Armed Forces by the end of 2008. As a result, the first batch of serial ZRPK "Pantsir-S" was transferred by the manufacturer (KBP, Tula) to the Russian Air Force on March 18, 2010 (10 units). Assembly of serial ZRPK is carried out by the pilot production of KBP - JSC "Shcheglovsky Val" (Tula). During 2010 and the following years, it is planned to deliver 20 ZRPK to the Russian Air Force (including 10 already delivered in 2010). In January 2012, information appeared in the media that by 2020 about 100 ZRPK "Pantsir-S" will be delivered to the Russian Air Defense Forces. On November 16, 2012, ZRPK "Pantsir-S" was officially accepted into service by the Russian Armed Forces. By default, the data of ZRPK "Pantsir-S1" model 2007. ★★★★

The combat vehicle of the Pantsir-S anti-aircraft missile and gun system after the parade on May 9, 2011 in Moscow (photo by Bomber, http://www.rusmed-forever.ru).

Author: DIMMI Created: 26.07.2011 21:57:12 Comments: 217 READ THE FULL ARTICLE

S-75 - SA-2 GUIDELINE

DATA AS OF 2010 (in progress)
SA-75 Dvina complex, V-750 (1D) and V-750V (13D) missiles - SA-2 GUIDELINE mod.1
S-75 Desna complex, V-750VN (13D) missiles - SA-2 GUIDELINE mod.2
S-75M Volkhov complex, V-755 (20 D / 20 DP) missiles - SA-2 GUIDELINE mod.3
S-75M2 complex, 20D missiles - SA-2 GUIDELINE mod.4
S-75M3 complex, 5Ya23 missiles - SA-2 GUIDELINE mod.4
The Volga Complex (export version)
★★

Anti-aircraft missile system It was developed using the S-25 backlog in SKB-31 (a division of KB-1 for air defense issues) under the supervision of A.A. Raspletin and B.V. Bunkin in accordance with the USSR Government Resolution No. 2838-1201 of November 20, 1953 on the development and construction of a mobile anti-aircraft missile weapon system. The missile was developed by OKB-2 (now MKB Fakel), chief designer - P.D. Grushin.

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Rishat 2024-09-0
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Rishat 2024-09-0

Testing of the complex began in 1955 on an experimental test site model of the SAM system. In mid-1956, testing of an experimental model of a mobile missile guidance station began. The SA-75 Dvina complex was accepted into service with the Air Defense Forces in 1957 (its first basing location was near Brest).

Polygon launcher with a 1D missile of the SA-75/SA-2 GUIDELINE complex (photo by MKB Fakel, http://pvo.guns.ru).

Author: DIMMI Created: 17.03.2009 00:24:14 Comments: 45 READ THE FULL ARTICLE

Complex 9K333 Verba, missile 9M336 - SA-25

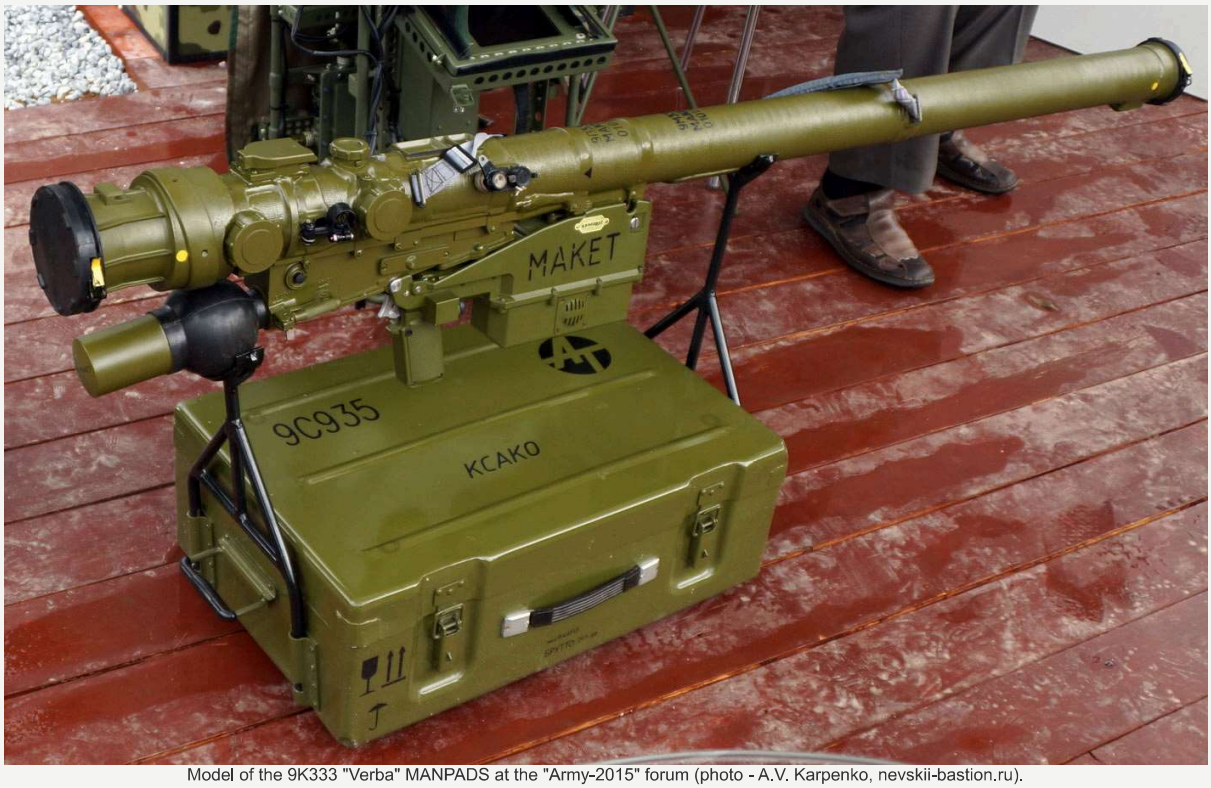
DATA AS OF 2022 (standard replenishment)
9K333 "Verba" system, 9M336 missile - SA-25
★★★

Man-portable air defense system (MANPADS). Developed by the Machine-Building Design Bureau (Kolomna) based on the Igla-S MANPADS.

In 2007, the system underwent flight design tests. State tests of the system were planned for 2009-2010. Troop tests at the R&D stage began at the proving ground of the 726th training center of the ground forces in Yeysk, Krasnodar Krai, on June 9, 2011. During 2011, it was planned to complete the R&D on the creation of the system and purchase 250 MANPADS for the ground forces under the 2011 order. Qualification tests of the MANPADS were successfully completed in the spring of 2014 (source).

As of 2008, it was planned to adopt the MANPADS into service by the end of the year. In 2012, re-equipment of production for the 9K333 systems began at the cooperation enterprises for the production of MANPADS. In particular, re-equipment work was carried out at the Machine-Building Design Bureau in terms of manufacturing automated test stands (source). In 2012, production of 9M336 missiles began at Production No. 21 of the Degtyarev Plant (Kovrov, source), where the 9K333 MANPADS are probably also produced.

In 2013, a contract was signed with the Russian Ministry of Defense for the delivery of four brigade sets of MANPADS for the ground forces and four divisional sets for the Airborne Forces during 2014-2015 (source). The first serial batch of 9M336 SAMs was released in May 2014 (source). In early June 2014, the media reported on the first deliveries of the Verba MANPADS to the anti-aircraft regiment of the 98th Airborne Division of the Russian Armed Forces (Ivanovo Region), which took place in late May 2014. At the end of November 2015, the 2013 contract was fully fulfilled.



Model of the 9K333 "Verba" MANPADS at the "Army-2015" forum (photo - A.V. Karpenko, nevskii-bastion.ru).

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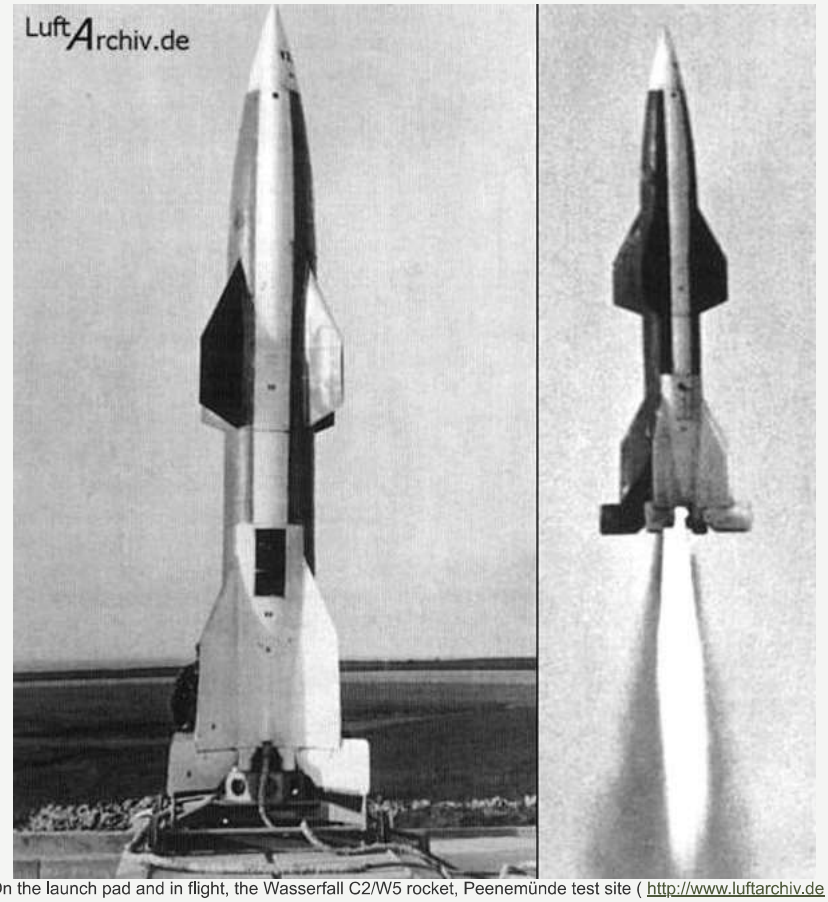
Author: DIMMI Created: 18.06.2011 08:24:01 Comments: 20 READ THE FULL ARTICLE

Wasserfall / P-101

DATA AS OF 2022 (standard replenishment)
Wasserfall C2 W1 / W5 / W10
R-101 / R-101B / R-102
★★★★

Surface-to-air missile / ballistic missile / Navy ballistic missile. After the end of the Great Patriotic War, on May 13, 1946, the USSR Council of Ministers adopted Resolution No. 1017-419 "Questions of Rocket Armament". This Resolution for 1946-1948 set the tasks of complete restoration of technical documentation and samples of German anti-aircraft guided missiles; restoration of laboratories and stands with all the equipment and devices necessary for conducting research and experiments on Wasserfall missiles; training of Soviet specialists who would master the design of missiles, testing methods, technology for the production of parts and components and assembly of missiles. Work on captured Wasserfall anti-aircraft missiles under the index R-101 was carried out by Department No. 4 of the Special Design Bureau of the Scientific Research Institute-88 (future OKB-1 of the Scientific Research Institute-88), chief designer - E.V. Sinilshchikov.

The Wasserfall C2 guided anti-aircraft missile was created in Germany under the general supervision of Werner von Braun using the technological achievements of the V-2 project, chief designer - Walter Dornberger. The development of the SAM concept began in 1941. The contract for the creation of the missile was concluded on November 2, 1942. At the same time, requirements for the missile were issued. It was planned to ensure the probability of hitting bomber-type targets of at least 50%. Technical design was carried out in 1943. The first (unsuccessful) launch of the missile took place on February 29, 1944. At the same time, preparations for serial production of the missile began, but serial production was never established by the end of the war, although it was planned to produce 5,000 missiles. The first modifications of the W1 and W5 missiles differ significantly in size and performance characteristics from the last modification W10. In March 1945, during tests, the missile reached an altitude of 16 km and showed a speed of 780 m/s. Data on the possible combat use of the Wasserfall SAM is most likely incorrect. Some researchers believe that no more than 50 missiles were launched in total (*source - Burgess E.*), others (*source - Book on 658 ZRP*) report that protocols of 40 experimental missile launches were discovered, of which only 14 were successful.



On the launch pad and in flight, the Wasserfall C2/W5 rocket, Peenemünde test site (http://www.luftarchiv.de).

Author: DIMMI Created: 13.01.2013 10:16:41 Comments: 10 READ THE FULL ARTICLE

9K310 Igla-1 - SA-16 GIMLET

DATA AS OF 2022 (standard replenishment)
9K310 Igla-1 complex, 9M313 missile - SA-16 GIMLET
★★

Man-portable air defense system (MANPADS). Developed by the Design Bureau of Mechanical Engineering (Kolomna). The development of the main project of the Igla MANPADS was started in 1971. By the decision of the Military-Industrial Complex under the Council of Ministers of the USSR dated May 6, 1978, No. 114, simultaneously with the development of the Igla complex, KBM (Kolomna) began work on the creation of a simplified man-portable air defense system Igla-1 using a modified thermal seeker from the Strela-3 complex missile in the anti-aircraft missile .

The Igla-1 MANPADS was developed by the following cooperation of enterprises:
- the complex and the missile - Design Bureau of Mechanical Engineering of the Ministry of General Mechanical Engineering (KBM MOM, Kolomna);
- IR homing head - Design Bureau of the Frunze Arsenal Plant of the Ministry of General Machine Building (KBAF MOM, Leningrad);
- safety-actuating mechanism (SAM) - Poisk Research Institute of the Ministry of Defense Industry (Murino, Leningrad Region);
- solid fuel for solid-propellant rocket motors - Soyuz Scientific Production Association of the Ministry of Defense Industry (Dzerzhinsky, Moscow Region).

Serial production of the 9K310 Igla-1 MANPADS was carried out at the Kovrov Arms Plant named after V. A. Degtyarev (Kovrov) . The homing heads were produced by the Leningrad Optical-Mechanical Association (LOMO), solid rocket fuel was produced by the Morozov Plant (Leningrad Region), and the operator's tablet (OT) was produced by the Izhevsk Electromechanical Plant of the Ministry of Radio Industry (IEMZ MRP, Izhevsk , Udmurtia).

Joint tests of the Igla-1 MANPADS consisting of a missile in a launch tube, a launch mechanism with a ground-based radar interrogator , and a portable electronic tablet were conducted from January 15 to July 9, 1980 at the Donguz test site (test site chief V.I. Kuleshov) under the supervision of a commission headed by Yu.I. Tretyakov. The system successfully passed the tests.

A simplified version with reduced characteristics, the 9K310 Igla-1, was adopted by the Soviet Army by the Resolution of the CPSU Central Committee and the USSR Council of Ministers of March 11, 1981 .

Models of MANPADS (top to bottom) 9K333 "Verba", "Igla-S", "Igla" and "Igla-1" as part of the exhibition at the conference "Problems of Theory and Practice of Development of Ground Forces Air Defense Forces in Modern Conditions", Smolensk, June 2013 (source).

Author: DIMMI Created: 08.03.2022 21:26:45 Comments: 1 READ THE FULL ARTICLE

9K34 Strela-3 - SA-14 GREMLIN

DATA FOR 2014 (in progress)
The 9K34 Strela-3 complex, the 9M36 / 9M36-1 missile - SA-14 GREMLIN
★★★

Man-portable air defense system (MANPADS). It was created under the supervision of S.P. Nepobedimy in the Machine-Building Design Bureau (Kolomna). The development of the MANPADS was started by the Resolution of the USSR Council of Ministers of September 2, 1968 - the same Resolution specified the creation of the Strela-2M MANPADS .

Joint tests of the MANPADS consisting of the 9M36 SAM in the 9P59 launch tube and the 9P58M launch mechanism were held at the Donguz test site from November 1972 to May 1973 (the test site chief at that time was O.K. Dmitriev) under the supervision of a commission headed by D.A. Smirnov. During the tests, shortcomings related to the insufficient reliability of the onboard SAM equipment element base were identified and eliminated.

By the Decree of the USSR Council of Ministers of January 18, 1974, the complex was accepted into service. The State Prize for its creation was awarded to L.G. Deyev, E.A. Oleynikov, A.S. Yablonsky, M.N. Diktov, I.K. Polosin, V.V. Golovatenko, Yu.I. Fedorovsky, G.V. Izyurov, A.M. Cheprakov and others (source). Serial production of the MANPADS was carried out at the V.A. Degtyarev Plant (Kovrov) from 1973 to 1981.

MANPADS 9K34 "Strela-3" (c) http://militaryrussia.ru

Author: DIMMI Created: 13.06.2014 21:04:27 Comments: 3 READ THE FULL ARTICLE

9K338 Igla-S - SA-24 GRINCH

DATA AS OF 2017 (standard replenishment)
9K338 Igla-S / Igla-Super complex, 9M342 missile - SA-24 GRINCH

Man-portable air defense system (MANPADS). Developed by the Machine-Building Design Bureau (Kolomna), chief designer - R.V. Fokin, as a modernization of the 9K38 Igla MANPADS. The MANPADS was created using the developments and experience of creating the Igla-D MANPADS with a collapsible launch tube and the Igla-N with a new, more powerful warhead. A special feature of the complex is the ability to engage targets from all angles, including small-sized targets (cruise missiles, UAVs). State tests were completed in December 2001; the complex was accepted into service with the Russian Armed Forces. Serial production of the complexes has been carried out by JSC "V.A. Degtyarev Plant" (Kovrov) since December 1, 2004 (*idelf.ru*), some of the units of the complex have been produced by the Serpukhov Metallist Plant (steering machines, aerodynamic control surface unit, etc.) since at least 2008.

The following components of the SAM system have been newly developed for the Igla-S complex: seeker head, cruise engine, missile instrument compartment, steering machines, warhead, booster engine, tube, battery, etc.

9K338 Igla-S MANPADS on a support device with a 9S520 set of means, MAKS-2009 air show (photo - A.V. Karpenko, http://bastion-karpenko.narod.ru/).

Author: DIMMI Created: 10/31/2010 10:18:44 PM Comments: 58 READ THE FULL ARTICLE

Complex 14Ts034 Peresvet / R&D Corrector

DATA AS OF 2020 (standard replenishment)
R & D "Ispravitel"
Complex 14Ts034 "Peresvet"

Combat mobile laser complex / complex for counteracting the functioning of optical means of artificial satellites. In the annual report of the IAC "Vympel" of the Almaz-Antey Air Defense Concern for 2010, it was stated that one of the company's tasks is " the creation of an anti-space defense system (anti-satellite warfare) of the first stage of development based on the existing scientific and technical reserve and newly created ground- and air-based anti-space defense systems for fire destruction and functional suppression of low-orbit foreign military spacecraft" (source). It is assumed that for the functional suppression of the operation of the electronic-optical means of the artificial satellites of a potential enemy, it was proposed to use medium-power laser systems. In 2012, the Russian Ministry of Defense announced a competition to conduct R & D "Study of ways to create a land-based mobile laser system for thermal and

functional destruction of air targets" code "Ispravitel". The competition announced by the Ministry of Defense on June 28, 2012 was won by the State Educational Institution of Higher Professional Education "Bauman Moscow State Technical University". State contract for the implementation of R & D No. 847/3K/2012/ДРГ3 was concluded on July 18, 2012 (ist - Resolution). In addition to Bauman Moscow State Technical University, GSKB Almaz-Antey also participated in the competition. The work on the first stage of the R & D "Ispravitel" was completed by Bauman Moscow State Technical University in full in 2012 and accepted by the Russian Ministry of Defense (ist - Resolution). On August 3, 2016, Russian Deputy Defense Minister Yuri Borisov, speaking at a meeting dedicated to the 70th anniversary of the Russian Federal Nuclear Center in Sarov, said that prototypes of systems using new physical principles had entered service with the Russian Armed Forces. On March 1, 2018, in a speech before the Federal Assembly of Russia, V.V. Putin publicly presented for the first time a combat anti-aircraft laser system, which was later named "Peresvet". The footage of the deployment of the combat laser system shown in the video was likely filmed in 2017. On March 12, 2018, the Russian Deputy Defense Minister said that the system was accepted into service in 2017 and uses a nuclear power plant (source). There are no public performance characteristics of the system or data on the developer of the system as of August 2018.

The Peresvet combat mobile laser system in combat position, presumably 2017 (frame from a video by the Russian Ministry of Defense, 01.03.2018).

Author: DIMMI Created: 13.09.2012 07:39:45 Comments: 20 READ THE FULL ARTICLE

9K317M Buk-M3, missile 9M317M

DATA AS OF 2017 (standard replenishment)
9K317M "Buk-M3" / "ZRK SD" complex, 9M317M missile

Medium-range anti-aircraft missile system / SAM of the operational (army) level of air defense of ground forces. The complex is being developed by the V.V. Tikhomirov Institute of Instrument Making. The chief designer of the SAM is E.A. Pigin. The development of the SAM began in 1990 (*source - History...*). In December 1992, Russian President B.N. Yeltsin signed an order to modernize the Buk SAM (source).

Tests of the SAM with missile launches were conducted at the Kapustin Yar test site in 2005-2011. In 2006, information appeared that the complex was undergoing factory tests (source). According to the annual report for 2011 of the Almaz-Antey Air Defense Concern, state tests of the 9K317M SAM system with the 9M317M SAM were conducted in 2011 (source). In particular, a successful launch of the Reis target UAV was conducted on 14.12.2011 (source). According to data for 2012, state tests of the SAM system are ongoing (source), although it was later reported that state tests of the SAM system were successfully completed in 2011 (*source - History...*).

The missile of the 9M317M system was first shown at the international exhibition Defendory International - 2006 in Greece, as a SAM of the promising Buk-M3 system (source).

In September 2007, it was planned to accept the system into service in 2009 (source , source), but these plans were not realized. Based on the results of 2012, it was planned to start serial production of the complex in the first half of 2013 (source), but at the end of 2013, the media announced that the Buk-M3 SAM system was planned to be delivered to the Russian Armed Forces in 2016 (source). The first brigade set of serial Buk-M3 SAM systems was planned to be delivered to the Russian Armed Forces in 2016. As a result, in October 2016, the first division of Buk-M3 SAM systems was delivered to the Russian Armed Forces (source).

The 9M317M missile has been produced by the Dolgoprudny Scientific and Production Enterprise since at least 2006.

In the media and elsewhere, the complex was referred to as "RVZ SD" (apparently, "medium-range military anti-aircraft missile"), which is not official and actually exists.

Self-propelled launcher (SPU) of the 9K317M Buk-M3 air defense missile system with full-size and weight mock-ups of the TPK during testing at the Kapustin Yar proving ground (History of domestic radar. Moscow, Stolichnaya Encyclopedia, 2014).

Author: DIMMI Created: 29.12.2013 22:42:57 Comments: 37 READ THE FULL ARTICLE

System S-500 / 55R6M Triumfator-M, complex 98Zh6M1 - SA-X-26

DATA AS OF 2017 (standard replenishment)
S-500 Prometheus / 55R6M Triumfator-M / Triumfator-MR system, 98Zh6M1 complex - SA-X-26
S-1000
NIR Samoderzhets system, NIR Vlastelin-TP
★★★

Anti-aircraft missile system for air defense and missile defense / long-range anti-aircraft missile system. The S-500 system is being developed by the State Design Bureau of the Almaz-Antey Air Defense Concern. In 2002, NPO Almaz prepared an engineering note on the creation of a 5th generation anti-aircraft missile system, and outlined the main performance characteristics of the system. Development of the appearance of the SAM began in 2003. In 2004, the preliminary design of the S-500 SAM began. In 2005, NPO Almaz completed work on a component of the Vlastelin research project and work on the Samoderzhets-A-A research project within the framework of the State Defense Order for 2005. In 2006, the Scientific and Technical Council of the Military-Industrial Complex under the Council of Ministers of Russia and the Board of Directors of the Almaz-Antey Air Defense Concern proposed to appoint the GSKB of the Almaz-Antey Air Defense Concern as the lead design bureau for the development of the S-500 5th generation air defense/missile defense system. On February 27, 2007, the Scientific and Technical Council of the Military-Industrial Complex under the Government of Russia approved the GSKB as the lead developer of the Unified Air Defense Missile Weapons System, which includes the S-500 air defense system as one of the components.

2008 GSKB Almaz-Antey carries out the 4th stage of the R&D project "Vlastelin-TP" ("Triumfator-Prometheus"), work is underway on the preliminary design of the product 97L6 R&D project "Vlastelin-TP".

2009 the development of the S-500 SAM system was announced in the media, and the development of working design documentation for the S-500 SAM system is underway. By order of JSC MKB Fakel in 2009 JSC Radiofizika carried out work on the component part of the R&D project "Triumfator-MR-RF". Stages 1 "Development of the technical design of product 77N6.1.R" and stage 2 "Prototyping of product 77N6.1.R" were carried out. The work was completed in 2010. In 2009, advance payments for the works were received in the amount of 13.698 million rubles, including 4.883 million rubles for stage 1 and 8.815 million rubles for stage 2 (source). By order of JSC GSKB Almaz-Antey and JSC Radiofizika, the active antenna array of the 77T6 multifunctional radar is being developed according to the MC R&D project Triumfator-AAR-1. At stage 1, a technical project was developed for the antenna array of the 77T6 product. The volume of work in 2009 in contract prices amounted to 52.790 million rubles. At the same time, JSC Radiofizika was working on the MC R&D project "Development, manufacture, adjustment and testing of a mock-up of an X-band AFAR fragment with optical power supply" code MC R&D project Triumfator-M "TA-256". In 2009, stages 1 “Development and production of a prototype of an X-band APAA fragment with optical power supply” and 2 “Configuration and testing of a prototype of an X-band APAA fragment with optical power supply” were completed. The work is being completed in 2010 (in 2009, an advance payment for stage 1 in the amount of 28.536 million rubles was received). By order of JSC GSKB Almaz-Antey, the development and manufacture of the 1TA120 subarray mockup is being carried out, as well as the manufacture of a test rig and testing of the subarray mockup (code SC ROC "Triumfator-MKT-F"). Under stage 1, the mockup of the antenna device based on an AFAR with feeder excitation for the 77T6 product and testing of the mockup units were carried out. Work has begun on stage 2 "Adjustment and testing of the mockup of the antenna device based on an AFAR with feeder excitation for the 77T6 product" (source).

2010 GSKB Almaz-Antey developed the technical design of the 55R6M air defense system and the technical design of the 98Zh6M1 missile complex, the possibility of developing a system with the required TTX, communication means for the air defense system were developed, control means were tested in a full-scale experiment. Also in 2010, a mock-up of the air defense missile system - products 77T6, 77N6-N and 77N6-N1 - was conducted, a MIMS (mock-up) of the main component of the system - the anti-aircraft missile system 98Zh6M1 was created, autonomous development of the software was conducted (

source - Annual report of GSKB "Almaz-Antey" for 2009-2010).

The name SA-X-26 has not been officially confirmed.

Presumably the S-500 SAM launcher type 77P6-1 on the MZKT-792911 chassis (New Year's calendar of the Almaz-Antey Air Defense Concern for 2015 via Said Aminov, http://saidpvo.livejournal.com , processed by http://militaryrussia.ru).

Author: DIMMI Created: 20.07.2010 02:23:31 Comments: 161 READ THE FULL ARTICLE

9K37 Buk - SA-11 GADFLY

DATA AS OF 2017 (in progress)
9K37 Buk complex, 9M38 missile - SA-11 GADFLY
9K37M1 Buk-M1 complex, 9M38 missile - SA-11 GADFLY
9K37M1-2 Buk-M1-2 complex, 9M38 and 9M317 missiles - SA-11 GADFLY
★★★

Medium-range anti-aircraft missile system / SAM of the operational (army) level of air defense of ground forces. The complex was developed by the Tikhomirov Institute of Instrument Making. The chief designer of the SAM is A.A. Rastov.

The development of the complex to replace the troop-based Kub SAM was started by the Decree of the USSR Council of Ministers dated January 13, 1972, by almost the same composition of enterprises that created the Kub SAM:

- Research Institute of Instrument Engineering named after V.V. Tikhomirov (former OKB-15 GKAT):
  - the complex as a whole (chief designer A.A. Rastov);
  - command post 9S470 (lead designer G.N. Valaev, later - V.I. Sokiran);
  - self-propelled firing units 9A38 (lead designer V.V. Matyashev);
  - semi-active radar homing head 9E50 of the 9M38 missile (lead designer I.G. Akopyan);
- Research Institute of Measuring Instruments (NIIIP) MRP - detection and target designation station 9S18 "Kupol" (chief designer A.P. Vetoshko, later - Yu.P. Shchekotov);
- OKB Novator - missile 9M38 (chief designer L.V. Lyulyev);
- MKB "Start" (former OKB-203 GKAT) - launcher and loader unit 9A39 (chief designer A.I. Yaskin);
- OKB-40 of the Mytishchi Machine-Building Plant (MMZ) - chassis of the complex's equipment (chief designer N.A. Astrov);

Simultaneously with the creation of the SAM system for ground forces with the 9M38 missile, it was planned to create the naval SAM system M-22 "Hurricane".

Initially, it was planned to complete the development of the SAM system in the second quarter of 1975, but when it became clear that the task was somewhat more complicated than it seemed, it was decided to divide the development of the SAM system into two stages (by Resolution of the Council of Ministers of the USSR dated May 22, 1974):

- The first stage involved the development of the 9M38 SAM and the 9A38 self-propelled launcher and their inclusion as the 9K37-1 Buk-1 SAM system in the 2K12 Kub-M3 SAM system. It was planned to include one 9A38 self-propelled launcher in each Kub-M3 SAM battery. Joint testing of this SAM system was planned to begin in September 1974. In this configuration, the SAM system was called the 2K12M4 Kub-M4 and was accepted into service in 1978.
- The second stage involved the creation of the Buk SAM system itself, consisting of a 9S18 detection station, a 9S470 command post, a 9A310 self-

propelled firing unit, and a 9A39 launcher and loader with 9M38 anti-aircraft guided missiles.

Tests of the 9K37-1 Buk-1 SAM system were conducted at the Emba test site from August 1975 to October 1976 as part of the 1S91M3 self-propelled reconnaissance and guidance system (SURN), the 9A38 self-propelled fire system (SOU), the 2P25M3 self-propelled launcher (SPU), with 3M9M3 and 9M38 missiles, and the 9V881 maintenance vehicle (MTO). Under the designation 2K12M4 Kub-M4 SAM system, the system was accepted into service with the USSR Ground Forces Air Defense in 1978. After the start of serial production, the new SAM system was delivered to the troops.

Joint tests of the Buk SAM system in full (without the Kub SAM system) were conducted at the Emba test site from November 1977 to March 1979. In 1980, the 9K37 Buk SAM system in full was accepted into service.

SAM 9K37M1. From left to right: command post 9S470M1, SOC 9S18M1 "Kupol-M1", self-propelled gun 9A310M1, PZU 9A39M1 and transport vehicle 9T229 on the KrAZ-255B chassis (photo by Leonid Yakutin, archive http://vpk-news.ru).

Author: DIMMI Created: 02.04.2017 20:39:32 Comments: 2 READ THE FULL ARTICLE

System S-400 / 40P6 Triumph, complex 98Zh6 - SA-21 GROWLER

DATA AS OF 2017 (standard replenishment)
S-400 (S-300PM3) "Triumph" / 40R6 system, 98Zh6 complex - SA-21 GROWLER

★★ Anti-aircraft missile system of object air defense / anti-aircraft missile system with detection, coordination and target designation means. Development of the S-300PM3 / S-400 air defense system was started by NPO Almaz / GSKB Almaz-Antey (general designer - A. Lemansky) in the process of developing the S-300 air defense system family in 1986 (source). The system differs from previous generations in its greater capabilities in terms of the size of the air defense zone, types of targets hit, and ensures interaction with air defense systems of previous generations. The SAM uses missiles developed by the Fakel Design Bureau. Serial production of missiles for the S-300 and S-400 systems in 2010-2012 was carried out by MMZ "Avangard" (source). The S-400 "Triumph" system was accepted into service by the Decree of the Government of the Russian Federation on April 28, 2007 (source). The first missile division of the S-400 SAM system took up combat duty in the city of Elektrostal in the Moscow Region on August 6, 2007. The first combat firing of the 40R6 system as part of the 98Zh6 complex was successfully conducted at the Kapustin Yar test site in 2011. Exercises of combat crews of the 40R6 system are being conducted at the Ashuluk air defense test site. ★★

The 5P85T2 launcher of the S-400 Triumph air defense missile system during a parade rehearsal on Red Square in Alabino, 13.04.2012 (photo - Vitaly Kuzmin, http://www.vitalykuzmin.net).

Author: DIMMI Created: 11.10.2011 22:33:07 Comments: 376 READ THE FULL ARTICLE

5th generation medium-range air defense missile system (project)

DATA AS OF 2017 (in progress)
5th generation medium-range air defense missile system (project)
★

Medium-range air defense missile system / operational (army) level air defense missile system of ground forces. The system is being developed by the V.V. Tikhomirov Institute of Instrument Making. The development of the air defense missile system was started in 2016 on an initiative basis using the Institute's own funds without a technical assignment from the Russian Ministry of Defense as part of work on the Buk-type air defense missile system line. This decision was approved by the Board of the Military-Industrial Complex under the Government of Russia. The air defense missile system is expected to be completed in 2023-2026.

On January 23, 2017, the General Director of the Research Institute of Anti-Virus, Yuri Bely, told the media: “The new complex is planned to further increase its noise immunity and survivability, automate and robotize combat assets, expand detection and destruction zones, increase the depth of integration into a single echeloned air defense system, or, in other words, the depth of support for the network-centric control system” (source).

Author: DIMMI Created: 23.01.2017 22:51:36 Comments: 1 READ THE FULL ARTICLE

Complex 42S6 Morpheus

DATA AS OF 2017 (standard replenishment)
Complex 42S6 "Morpheus"
★★★

Short-range anti-aircraft missile system / anti-aircraft missile air defense system. Development is carried out by GSKB of the Almaz-Antey Air Defense Concern. On February 27, 2007, the Scientific and Technical Council of the Military-Industrial Complex under the Government of the Russian Federation designated GSKB as the lead developer of the Unified Anti-Aircraft Missile Weapon System with the Morpheus short-range air defense missile system (the R&D project of the same name). The complex is not a military air defense system. In 2008, the development of a preliminary design was completed within the framework of the Morpheus R&D project. In 2009-2010. The technical design is being developed and plans have been announced for the SAM to be put into service with the Russian Armed Forces by 2015. In 2010, GSKB Almaz-Antey developed a set of working design documentation for a multifunctional radar (MFRR), manufactured individual finished MFRR devices and a command post, manufactured a prototype MFRR, and manufactured a chassis for the combat vehicle (source: GSKB Almaz-Antey Annual Report for 2009).

According to unconfirmed data, as of the first half of July 2011, the production of a prototype 70N6 combat vehicle was completed. In August 2011, the media announced that the system would be accepted into service with the Air Defense Forces in 2013. There is also a possibility that the combat vehicle will be shown at the MAKS-2011 air show (it did not happen).

On April 24, 2013, Deputy Minister of Defense of the Russian Federation Colonel General Oleg Ostapenko announced in the media that the Morpheus ultra-low-altitude air defense system would be accepted into service in 2015.

Presumably, the failures in developing the system were one of the reasons for the reshuffle in the leadership of the Almaz-Antey Air Defense Concern in 2016.

ЗРС „Морфей" гипотетический вариант 1

ЗРС „Морфей" гипотетический вариант 2

ЗРС „Морфей" гипотетический вариант 1.1

ЗРС „Морфей" гипотетический вариант 1.2

Early hypothetical - sketches of options for presenting the PU 70N6 SAM 42S6 "Morpheus" with a rotating radar antenna and 24 SAM containers (c) 2010,

version from 22.06-23.07.2010, graphic processing and revision - Allocer.

Author: DIMMI Created: 18.06.2010 04:55:03 Comments: 311 READ THE FULL ARTICLE

S-350/50R6/50R6A Vityaz

DATA AS OF 2017 (standard replenishment)
S-350 / 50R6 / 50R6A Vityaz Complex / Vityaz-PVO R&D
Anti-aircraft missile system with air defense / medium-range anti-aircraft missile system. Developed by GSKB of the Almaz-Antey Air Defense Concern, chief designer - Ilya Isakov (*source - The latest ...*). Preliminary development of the complex to replace the S-300 SAM system was started by NPO Almaz in 1991-1993. The first mentions of the Vityaz SAM project date back to the MAKS-1999 air show, where models of combat vehicles of the complex on the KAMAZ chassis were demonstrated. Later, the models were shown at MAKS-2001. The complex is intended to replace the S-300P / S-300PM SAM system. The development of the Vityaz SAM system began in 2007 with plans to put it into service in 2012. The SAM system was created using developments from the export project of the KM-SAM SAM system, designed by the Almaz-Antey State Design Bureau for South Korea. In 2009-2011, the Almaz-Antey State Design Bureau conducted the Vityaz-PVO R&D project. In 2010, the development of design documentation began, and the completion of the design documentation was planned for 2011 (source: Noveyushaya...). In 2010, GSKB Almaz-Antey completed the development of working design documentation for a combat control post and a multifunctional radar, manufactured a prototype of a combat control post, individual complete devices for combat control posts (CCP) and a multifunctional radar, conducted equipment docking and autonomous testing of a prototype CCP (source - Almaz-Antey GSKB Annual Report for 2009). In 2011, the Almaz-Antey Air Defense Concern completed the development of software and algorithmic support for the 50N6A multifunctional radar of the 50K6A combat control post of the 50R6 complex, completed the equipment of the V-100 container from the V-1 antenna post, and equipped the V-20 chassis from the 50N6A radar (Almaz-Antey Air Defense Concern, source - Annual Report 2011). In 2012, work was carried out to manufacture a prototype of the multifunctional radar, to develop a prototype of a specialized launcher, and to prepare the 50R6A system for preliminary and state tests (Almaz-Antey Air Defense Concern, *source - Annual Report 2012*). In 2013, the Almaz-Antey Air Defense Concern manufactured prototypes of a specialized launcher and a multifunctional radar for the S-350 air defense missile system (Almaz-Antey Air Defense Concern, *Annual Report for 2013*). The prototype of the Vityaz 50R6A air defense missile system is in ★★★

The 50P6A self-propelled launcher, the 50N6A multifunctional air target detection radar vehicle and the 50K6A combat control post were first publicly demonstrated at the Obukhov Plant (St. Petersburg) on June 19, 2013. Serial production of the system will be carried out in the North-West Regional Center of the Almaz-Antey Air Defense Concern, in particular at the Obukhov State Plant and the Radio Engineering Equipment Plant .

Tests . Field tests of the prototype SAM system were planned to begin in 2011, but according to data from the end of 2010, production of the prototype is planned for 2012 and its tests are planned to be completed in 2013. Deployment of the SAM system is planned to begin in 2015 (2010 plans). In mid-2013, it was reported that the complex would begin full-scale testing in 2014 (*source - Noveyushaya...*). Although earlier, in June 2013, it was reported that the SAM tests were to begin in the fall of 2013 (source).

In January 2012, the media reported that more than 30 Vityaz SAMs would be delivered to the Russian Air Defense Forces by 2020, which are planned to replace the S-300P/PS SAMs. Presumably, the Vityaz SAM can use two types of missiles - short-range (presumably 9M100) and medium-range (presumably 9M96). According to the Air Force Commander-in-Chief, Colonel General Alexander Zelin, it is assumed that the Vityaz SAM will have several times the combat capabilities of the S-300P SAM. In February 2012, the media announced that 38 divisional SAM systems were planned to be accepted into service.

On September 11, 2013, the head of the Almaz-Antey State Design Bureau, Vitaly Neskrodov, told the media that tests of the S-350 SAM system were planned to be completed in 2014, serial production would begin in 2015, and deliveries of the SAM system to air defense units would begin in 2016. The Vityaz air defense system should replace the famous S-300PS and S-300PM (PMU) in the Russian army.

Self-propelled launcher 50P6E of the S-350E "Vityaz" system, on the left - radar 50N6E. MAKS-2013 Air Show, Ramenskoye, 27.08.2013 (photo - Vitaly Kuzmin, source).

Author: DIMMI Created: 23.01.2012 21:31:49 Comments: 63 READ THE FULL ARTICLE

2K12 Cube - SA-6 GAINFUL

DATA FOR 2016 (in progress)
The 2K12 Kub complex, the 3M9, 3M9M, 3M9M1, 3M9M2, 3M9M3, 3M9M4 missile - SA-6 GAINFUL
The Kvadrat complex (export mod.), the 3M9M missile

★ Self-propelled anti-aircraft missile system for the air defense of ground forces. The complex was intended to provide air defense of ground forces and mainly tank divisions from air defense weapons at low and medium altitudes. The development of the SAM system was started by the Resolution of the Central Committee of the CPSU and the Council of Ministers of the USSR dated July 18, 1958. The lead developer of the SAM system is OKB-15 GKAT (formerly a branch of NII-17 GKAT - development of aircraft radars, Zhukovsky). Soon OKB-15 was transferred to the State Committee for Radio Electronics (GKRE) and later renamed the Research Institute of Instrument Engineering of the USSR Ministry of Radio Engineering Industry. The chief designer of the air defense missile system at the initial stage of development was the head of OKB-15, V.V. Tikhomirov. The development of the components of the complex was carried out by the following cooperation: - self-propelled reconnaissance and guidance unit (SURN) - OKB-15, chief designer - A.A. Rastov; - self-propelled launcher (SPU) - OKB-203 of the Sverdlovsk Council of National Economy (later - State Design Bureau of Compressor Engineering - GKBKM MAP, now - NPP Start), chief designer - A.I. Yaskin; - tracked chassis for SAM systems - Design Bureau of the Mytishchi Machine-Building Plant of the Moscow Regional Council of National Economy (later renamed as OKB-40 of the Ministry of Transport Machine-Building, now - Design Bureau as part of the PO Metrovagonmash), Chief Designer - N.A. Astrov; - anti-aircraft guided missile (SAM) - Design Bureau of Plant No. 134 of the State Aviation Committee (later - GosMKB Vympel), Chief Designer - I.I. Toropov; - semi-active missile homing head - OKB-15, Chief Designer - Yu.N. Vekhov (since 1960 - I.G. Akopyan); According to the Resolution of 1958, it was planned to begin joint tests of the SAM system in the 2nd quarter of 1961, but both the development and testing of the complex were significantly delayed. One of the reasons for the delay is considered to be the novelty of the technical solutions implemented in the complex. As a result, the chief designers of the complex and the rocket were removed from their positions. ★★

Self-propelled launcher 2P25 SAM 2K12 "Kub-M3" with missiles 3M9M3 (photo - Bundesgerhard, 2002, source).

Author: DIMMI Created: 05.11.2010 02:51:38 Comments: 9 READ THE FULL ARTICLE

9K31 Strela-1 - SA-9 GASKIN

DATA FOR 2016 (standard update)
The 9K31 Strela-1 complex, the 9M31 missile - SA-9 GASKIN
The 9K31M Strela-1M complex, the 9M31M missile - SA-9 GASKIN

★ Anti-aircraft missile system of the air defense of ground forces / project of a portable anti-aircraft missile system (MANPADS). The development of the complex as the 9K31 MANPADS was started by the Resolution of the Council of Ministers of the USSR No. 946-398 of August 25, 1960 in response to the development of a similar complex in the USA and simultaneously with the 9K32 Strela-2 MANPADS . The developer of the MANPADS and the 9M31 missile was OKB-16 GKOT (later renamed the Precision Engineering Design Bureau - KBTM, now the Tochmash Design Bureau), the chief designer was A.E. Nudelman. The development of the Strela-1 MANPADS was carried out in parallel with a more advanced development - the Strela-2 MANPADS . When it became clear that the development of a MANPADS with an IR homing head (Strela-2) would be successful, it was decided to use the developments on the Strela-1 MANPADS to create a mobile SAM system with higher requirements for the range and altitude of target destruction. Thus, in 1962-1963, the development of the MANPADS was discontinued and the development of the Strela-1 short-range SAM system for ground forces was started. When moving on to designing a troop self-propelled SAM, the developer proposed increasing the range to 5 km, and the altitude of target destruction to 3.5 km. The achievement of the performance characteristics was ensured by increasing the missile weight from 15 to 25 kg, the caliber from 100 to 120 mm, and the length of the missile from 1.25 to 1.8 m. Organizationally, the new SAM was proposed to be used in the air defense units of motorized rifle and tank

regiments. It was proposed to use the BRDM-2 as the chassis of the launcher. The new SAM was planned to be presented for joint tests in the 3rd quarter of 1964. However, due to difficulties with fine-tuning the seeker head, the development was delayed until the beginning of 1967. State tests of the Strela-1 SAM were conducted in 1968 at the Donguz proving ground. The system was accepted into service by the Resolution of the Central Committee of the CPSU and the Council of Ministers of the USSR dated April 25, 1968. Serial production of the 9A31 SAM combat vehicle was carried out at the Saratov Aggregate Plant of the USSR Ministry of Defense, and the 9M31 missile at the Kovrov Mechanical Plant of the USSR Ministry of Defense. For the development and acceptance into service of the Strela-1 SAM system, A.E. Nudelman, V.I. Shkolikov, G.S. Terentyev, and B.G. Paperny were awarded the USSR State Prize in 1970. ★★

Combat vehicle 9A31 SAM 9K31 "Strela-1" (http://www.kbtochmash.ru/).

Author: DIMMI Created: 05.11.2010 19:10:07 Comments: 20 READ THE FULL ARTICLE

S-25 Berkut Complex - SA-1 GUILD

DATA AS OF 2010 (in progress)
S-25 "Berkut" / "Sosna" complex, B-300 missile - SA-1 GUILD
S-25M complex
★★★

The first domestic multi-channel air defense system / anti-aircraft missile system. The development of the possibility of creating an SAM system was started by order of I.V. Stalin in the late 1940s. The Berkut SAM system was created specifically for the Moscow air defense system in KB-1 (formerly SB-1) of the 3rd Main Directorate of the USSR Council of Ministers under the supervision of chief designers P.N. Kuksenko and S.L. Beria (son of L.P. Beria). Since 1953, the chief designer of the S-25 system is A.A. Raspletin (formerly deputy chief designer). The missile was created in OKB-301 of the USSR Ministry of Aviation Industry under the supervision of chief designer S.A. Lavochkin. Ground equipment - GSKB MMP (future GSKB Spetsmash of the USSR Ministry of Medium Machine Building) under the supervision of V.P. Barmin. Guidance and control means - NII-244 of the USSR Ministry of Radio Industry.

The development of the complex was initiated by the Resolution of the USSR Council of Ministers No. 3389-1426 of August 9, 1950. The task was to create an air defense system capable of providing all-round defense of Moscow by simultaneously firing at targets detected at a distance of 200 km with the destruction of bombers flying at a speed of up to 1000 km/h at altitudes of up to 20-25 km with a probability close to 100%. The range of the missiles is 30-35 km. The decree established the following deadlines for the readiness of the prototypes of the air defense missile system:
- 4 prototypes of the guidance radar - February 1952
- prototypes of the missile equipment - July 1951
- 50 prototypes of missiles (surface-to-air and air-to-air, 25 each) - February 1952
- experimental prototype of the detection radar - July 1951
- 2 prototypes of the detection radar - May 1952
- prototype of the communication equipment for the detection radar and the guidance and control radar of the air defense missile system - May 1952
- development of technical designs for the specified systems - by March 1, 1951.

The composition of the air defense system according to the Decree of August 9, 1950:
- 56 air defense firing complexes located in two rings, located 45-50 and 85-90 kilometers from the center of Moscow;
- A-100 all-round surveillance radars, located at long-range (200–300 kilometers) and short-range (25–30 kilometers) lines and designed for early detection of targets;
- command posts;
- technical bases;
- road network;
- communication system

Each firing complex included a B-200 central guidance radar and a launch position for 60 B-300 missiles. In its sector, it was possible to simultaneously fire

up to 20 targets with 20 missiles.

A target missile based on the "217M" missile of the S-25M SAM system and the antenna post of the B-200 radar (part) of the S-25 SAM system / SA-1 GUILD in the museum at Khodynka Field in Moscow (photo by Tadeusz Mikutel, http://pvo.guns.ru)

Author: DIMMI Created: 03.11.2010 21:13:15 Comments: 14 READ THE FULL ARTICLE

9K32 Strela-2 - SA-7 GRAIL

DATA FOR 2014 (standard update)
The 9K32 Strela-2 system, the 9M32 SA-7A GRAIL missile
The 9K32M Strela-2M system, the 9M32M SA-7B GRAIL missile
★★★

A portable air defense missile system (MANPADS). It was developed under the supervision of S.P. Nepobedimy and B.I. Shavyrin in the Special Design Bureau of the State Defense Committee of the Russian Federation (since 1966, the Mechanical Engineering Design Bureau of the Ministry of Defense, Kolomna). Development of the system was started by Resolution of the USSR Council of Ministers No. 946-398 of August 25, 1960, in response to the development of a similar system in the USA.

Testing began in 1964. Serial production was carried out from 1966 to 1970 (large series starting in 1968) at the V.A. Degtyarev Plant (Kovrov). The complex was accepted into service by the USSR Armed Forces in 1968.

The production of the complex components was carried out at plants No. 7 (launch mechanism), No. 9 "Uralmash" in Sverdlovsk (launch tube), No. 14 (filling container), No. 16 - Kazan Engine-Building Association (missile). In the mid-1970s, the Strela-2 complex with the 9M32 missile was tested on Mi-2 helicopters (4 missiles on each) as an air-to-air weapon. Production of the Strela-2 / 2M MANPADS ceased in the first half of the 1980s.

By default, the data of the Strela-2 MANPADS.

MANPADS 9K32M2 "Strela-2M2" with missile 9M32M (http://upload.wikimedia.org/).

Author: DIMMI Created: 05.11.2010 18:51:52 Comments: 9 READ THE FULL ARTICLE

9K31 Strela-1 (project)

DATA FOR 2014 (standard update)
9K31 Strela-1 Complex (project), 9M31 Missile
★★★

Project of a portable anti-aircraft missile system (MANPADS). The first SAM system with this name. Development of the system was started by Resolution of the USSR Council of Ministers No. 946-398 of August 25, 1960 in response to the development of a similar system in the USA and simultaneously with the 9K32 Strela-2 MANPADS . The developer of the MANPADS and the 9M31 missile was OKB-16 GKOT (later renamed the Precision Engineering Design Bureau - KBTM, now the Tochmash Design Bureau), chief designer was A.E. Nudelman.

According to the Resolution, in the third quarter of 1962, the developer had to submit proposals for further work taking into account the results of firing tests of an experimental batch of missile samples. The first ballistic missile launches were conducted in 1961. In mid-1962, software and telemetry missile launches were conducted. The possibility of creating a complex that meets the requirements of the GRAU of the USSR Ministry of Defense was confirmed.

The development of the Strela-1 MANPADS was carried out in parallel with a more advanced development - the Strela-2 MANPADS . When it became clear that the development of a MANPADS with an IR homing head (Strela-2) would be successful, a decision was made to use the developments in the Strela-1 MANPADS to create a mobile SAM system with higher requirements for the range and altitude of target destruction. Thus, in 1962-1963, the development of the Strela-1 MANPADS was discontinued and the development of the Strela-1 short-range SAM system for ground forces was started.

The performance characteristics of the MANPADS are given in Resolution of the USSR Council of Ministers No. 946-398 of August 25, 1960.

The 9M31M missile of the 9K31M Strela1M air defense missile system without aerodynamic rudders and rollerons, as well as a cutaway model of the 9M31M missile in a 9Ya23M container on display at the Artillery Museum, St. Petersburg, 24.05.2012 (photo - Oleg Bebnev, source).

Author: DIMMI Created: 16.08.2014 23:14:31 Comments: 2 READ THE FULL ARTICLE

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